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Peaches For Freezing

By Kenneth D. Demaree

Studies covering 60 varieties of peaches grown at the U. S. Department of Agriculture Research Center at Beltsville, Md., indicate that 3 of them - July Elberta, Rio-Oso-Gem, and Triogem - are best suited for commercial freezing.

This conclusion was based not only on tests of suitability for freezing, in which these varieties ranked very high, but also on other characteristics which peach growers and processors would have to consider.

To be satisfactory for freezing, a peach variety, in addition to producing a good frozen product, should be productive, produce relatively large fruit, and in some areas be especially winter hardy. General adaptability to fresh market use or canning also is desirable. A number of the varieties tested by the Department, which ranked excellent or very good when frozen, lacked other desirable characteristics such as size, attractiveness, shape of fruit, yield, disease resistance, and tree vigor. These other characteristics have to be considered in breeding and selecting peach varieties for commercial use.

There were additional considerations. For instance, the Raritan Rose, an important commercial variety, produced a very desirable frozen product and might be useful to many home freezers, but usually white peach varieties are less popular than yellow ones for freezing commercially. Wherever Prairie Schooner, Herbhale and Southland peaches are grown commercially they could well be included among those desirable for freezing. They ranked high in the Department's tests but are not (or cannot) be grown in all locaties. Samples of the Ranger Variety grown in Virginia also gave an excellent frozen product, but the same variety from Delaware and Beltsville, Md., ranked down in the good group. There appeared to be no definite explanation for this variation.

The USDA studies of the suitability of peaches for freezing were made as an adjunct to peach breeding and varietal studies at the Beltsville Research Center. The work covered a period of three years during which many trees in the Department's orchard were discarded because of disease susceptibility, poor tree growth, poor producing ability or other reasons. Consequently, some varieties were studied during only one growing season. A few nectarine varieties were included in the tests.

In testing the varieties for suitability for freezing, research personnel used peaches harvested when firm ripe (2 to 3 days past the shipping stage) and held at 70 degrees Fahrenheit until they were soft ripe. Six fruits were selected at random from each variety sample and the juice

from 1/8 of each peach was squeezed into a container, well mixed, and the soluble solids were determined with a refractometer, with readings corrected for temperature.

The peaches were peeled by immersion in boiling water for 45 seconds, cooled in running water, halved, stoned, and mechanically sliced into 3/8 inch segments. One part sugar to 4 parts of fruit and 1 part ascorbic acid to 1,000 parts of fruit were added. If ascorbic acid had not been used to prevent browning, the rating of the varieties for freezing suitability would have been considerably different.

The prepared fruit was packed in 1- and 2- pound cardboard cartons with an inner liner of cellophane or laminated paper. The liners were sealed airtight with a hot iron. The packages were frozen and held at 0 degrees F. for $5\frac{1}{2}$ months or so, until removed for examination and grading.

Grading Factors

The frozen peaches were graded on the basis of four characteristics; color, texture, flavor, and general adaptability to freezing. The latter included not only the first three characteristics, but also overall appearance, and resistance to browning due to oxidation upon thawing. The taste panel consisted of experienced judges, who evaluated the fruit both when frozen and after thawing. They used a numerical scale in which 10 denoted the best and 1 the poorest. Scores of the judges for each variety were averaged, and, because there were no sharp lines of demarcation, arbitrary groupings were made as follows: 7.5 to 10, excellent; 6.8 to 7.4, good; 5.1 to 6.7, fair; and 1 to 5, poor.

The Elberta variety, chosen as the standard for grading because it is the most widely grown and most frequently frozen, had a rating of 6.9 for general adaptability, 6.3 for color, 6.0 for texture, and 6.9 for flavor. There were 22 varieties that rated higher than Elberta, 7 of equal rank, and 31 varieties that rated lower. Twelve varieties received a general adaptability rating of 7.5 or higher, with Stevenson Cling having a rank of 8.0, the highest rating given.

Best Varieties For Freezing

The 12 varieties rating excellent (7.5 - 10), in order of their adaptability for freezing were: Stevenson Cling, July Elberta, Raritan Rose, Kalhaven, Fredberta, Ranger (Grown in Virginia), Vedette, Prairie Schooner, Herbhale, Rio-Oso-Gem, Short, and Late Rose. These varieties except for Raritan Rose and Late Rose, rated high in all characteristics; both of these white-fleshed varieties were graded down because of color. Prairie Schooner had the highest average of the varieties tested during all three years of the study.

Twenty-two varieties rated good (6.8 to 7.4). The order of their adaptability for freezing was: Salberta, Romance, Southland, Wild Rose. Ozark, Triogem, Prairie Rambler, Sandhill #1, Rubired (nectarine), Elberta, Early Elberta, Fay Elberta, Redcrest, Sunday Elberta, Sunhigh, Valiant, Veteran, Dixiegem, Gage Elberta, Goodcheer, Halehaven, and Redhaven. A

few varieties in this group were excellent in flavor but were down graded because of color or texture. Sunday Elberta, one of this group, was also packed without sugar or ascorbic acid to determine the effects of such packing methods. Under these conditions, it was rated poor (3.1 for general adaptability, 2.9 for color, 4.7 for texture, and 2.0 for flavor).

Color And Other Factors Reduce Acceptability

Twenty-five varieties rated fair (5.1 to 6.7); they were: Sullivan Elberta, Peacharina (nectarine), White Hale, Golden Beauty, Ranger (grown in Delaware), Loring, Prairie Daybreak, Autumn, Fertile Hale, J. H. Hale, Newday, Redelberta, Summer Rose, Golden East, Friendship, Gemmer's Late Elberta, Afterglow, Ranger (grown in Maryland), Prairie Dawn, Prairie Rose, Golden Jubilee, Jerseyland, Lizzie, Prairie Sunrise, and Penryn. Most of these varieties had poor color (dusky red or streaked with red), were low in acidity or astringency, or browned rather readily after peeling. All the white-fleshed varieties (Raritan Rose, Late Rose, Wild Rose, Rubired nectarine, White Hale, Gower nectarine, Summer Rose, and Cherryred) were graded low on color, even though other characteristics such as texture or flavor were high, indicating that the yellow-fleshed varieties are preferable for freezing.

Three varieties rated poor (1.0 to 5.0). Two of these varieties were Cherryred and Ambergem, the tough-fleshed or non-melting (canning cling) type. Cherryred was white-fleshed, but the flesh was stained with red to the stone cavity so that it appeared blood red. This unattractive appearance was probably enough to place it in the poor group regardless of its other characteristics. The third variety in this group was Gower nectarine, with ratings of 4.6 for general adaptability, 3.9 for color, 5.5 for texture and 6.2 for flavor.

Solids Not A Measure Of Freezling Quality

While refractometer readings are a measure of soluble solids, including sugars, they are not necessarily a measure of quality. Some varieties that had low refractometer readings were of good quality, whereas others with high readings were of poor quality. Varieties high in pectin would give high soluble solids readings, but since pectin is tasteless it would not affect the flavor. Varieties high in tannins would be more astringent in flavor, but tannins would not greatly affect the soluble solids readings. Therefore, it was concluded that there is a rather poor correlation between high soluble solids and general adaptability ratings.

In the study no effort was made to include all peach varieties but rather to include those which were relatively new or untested and to include several of the better known varieties for comparison. Although the study was made over a relatively short period, including only one, two, or three years, it should give an indication of the freezing value of the varieties tested.

Participating in the study, beside the author, were Charles W. Culpepper, AMS plant physiologist, now retired, and Leon Havis, breeding work horticulturist with the Agricultural Research Service, USDA.

Quick Freezing Poultry Through Brine Immersion

By Dr. Lyle L. Davis

A quick, simple, one-step method of chilling and freezing packaged ready-to-cook poultry has been found feasible for commercial use in research done jointly by the University of Massachusetts and the U. S. Department of Agriculture. Known as "brine immersion" cooling, the process consists of chilling or freezing packaged eviscerated poultry in a tank of calcium chloride brine at a temperature of - 20 degrees Fahrenheit.

Up to 12 times faster than some of the currently used methods of freezing poultry with cold air after chilling in slush ice, the brine immersion process at present is recommended only for ready-to-cook poultry packaged in moisture-vapor resistant bags prior to chilling or freezing. While the process works considerably faster on unpackaged poultry, procedures still have to be developed for complete removal of the brine from birds chilled or frozen in it.

In extensive brine immersion tests on packaged chickens and turkeys no package failures were noted even though the bags used had to be cut and resealed to permit temperatures readings and no special care was taken to prevent rough handling. Taste tests of poultry so chilled or frozen showed no evidence of off flavor caused by the brine.

This method of cooling eviscerated poultry has other advantages. Packaging the product prior to cooling and combining cooling and freezing operations in one step minimizes possible contamination of birds during handling; reduces overall handling and labor costs; eliminates leaching of flavor that may take place during slush ice cooling; and provides a higher quality product with less shrinkage and better color and appearance.

Importance of rapid cooling to remove body heat is generally recognized in the production of fresh and frozen ready-to-cook poultry. The usual methods of cooling poultry currently used commercially include chilling in slush ice and air chilling in refrigerated rooms with some air circulation. Both methods take quite a bit of time and there has been considerable research devoted to developing improved and quicker methods.

In the research conducted by the University of Massachusetts and the Biological Sciences Branch, Agricultural Marketing Administration, at the Massachusetts Agricultural Experiment Station, chilling and freezing tests were made with chickens (broilers, fowl and stags) and turkeys (young hens and a few mature toms). The poultry, slaughtered outside the laboratory, was handled to prevent much loss of body heat prior to packaging and cooling.

Equipment used in the chilling and freezing tests was a 100 gallon tank, equipped with perforated pipes in the bottom to permit air to be bubbled through the cooling medium to assure good temperature distribution. An evaporation coil with a temperature control was located above these pipes to provide the necessary refrigeration. Calcium chloride brine was used as the cooling medium for all tests below 32 degrees F. These tests were run at 23, 0, and -20 degrees F. Temperature of birds during cooling was measured at 5-minute intervals.

As shown in the table below, 10 packaged and 10 unpackaged birds in each class of poultry except mature tom turkeys were used in each test. This table summarizes the results of the chilling and freezing tests for the various classes of poultry studied. Data presented represent those obtained from the slowest cooling birds in each instance.

In tests where poultry was leftin low temperature brine long enough to freeze completely, a carcas temperature of approximately 15 degrees F. was taken as the end point. It took about twice as long to freeze packaged poultry as it did to freeze unwrapped birds. But, it took only 5 hours to freeze packaged 12 pound turkeys in -20 degree brine which is in marked contrast to the upwards of 60 hours required in some air freezing operations.

Although there was some variation in freezing and chilling time for different sizes of birds, the results indicated that the freezing time per pound for poultry in -20 degree brine ranges from 20 to 3 minutes. Adequate chilling - to 40 degrees - should be provided by immersion in -20 degree brine for 6, 35, and 45 minutes for packaged, ready-to-cook broilers, 12-pound young hen turkeys, and 22 to 27-pound mature tom turkeys, respectively, followed by refrigeration at 36 degrees.

Chilling and Freezing of Poultry in a Liquid Medium

Poultry	*No. of birds*	*Ready-to-cook weight* Min lb	Min oz	Max lb	Max oz	*Packaging **	*Cooling medium*	*Time to chill to 40 F, min*	*Time to freeze to 15 F, min*
Broiler	10	1	15¼	2	6¾	packaged	33 F slush ice	95	—
Broiler	10	1	10	2	7	unpackaged	33 F slush ice	50	—
Broiler	10	2	2½	2	12	packaged	33 F water	105	—
Broiler	10	2	2¼	2	11½	unpackaged	33 F water	60	—
Broiler	10	2	2½	2	10¾	packaged	23 F brine	70	—
Broiler	10	1	12	2	11	unpackaged	23 F brine	27	—
Broiler	10	1	11½	2	6½	packaged	0 F brine	42	135
Broiler	10	1	13½	2	6½	unpackaged	0 F brine	24	55
Broiler	10	2	8	3	13	packaged	-20 F brine	35	85
Broiler	10	2	5	3	1½	unpackaged	-20 F brine	16	35
Fowl	10	3	6	5	12½	packaged	33 F slush ice	190	—
Fowl	10	3	½	4	15	unpackaged	33 F slush ice	90	—
Fowl	10	3	13	5	8	packaged	33 F water	195	—
Fowl	10	3	1½	5	12	unpackaged	33 F water	100	—
Fowl	10	2	15½	4	2½	packaged	23 F brine	105	—
Fowl	10	2	15	4	½	unpackaged	23 F brine	38	—
Stags	10	5	5	6	14½	packaged	33 F slush ice	220	—
Stags	10	5	4	7	6	unpackaged	33 F slush ice	95	—
Stags	10	5	6½	6	13½	packaged	33 F water	235	—
Stags	10	4	11	6	13	unpackaged	33 F water	135	—
Stags	10	5	5½	7	4	packaged	23 F brine	165	—
Stags	10	4	9½	6	2	unpackaged	23 F brine	55	—
Young hen turkey	10	9	2	13	1	packaged	0 F brine	215	500
Young hen turkey	10	9	5	12	7	unpackaged	0 F brine	110	280
Young hen turkey	10	11		12	13	packaged	-20 F brine	160	290
Young hen turkey	10	11	6	12	15	unpackaged	-20 F brine	60	140
Mature tom turkey	5	22	½	27	9	packaged	-20 F brine	205	425

** All packaged poultry were packed into moisture-vapor resistant bags which were vacuumized, clip-sealed, and shrunk by dipping into water at 205 F. Unpackaged poultry were not wrapped in any material but were placed directly in the cooling medium.*

Pallet System Cuts Egg Handling Costs

By L. Z. Eggleton and N. G. Paulhus

The use of pallets and pallet handling equipment in egg assembly plants provides a number of possibilities for improved handling methods and reduced costs. The handling of unit loads as large as 30 egg cases per pallet can substantially reduce the amount of labor needed and can speed up all loading, unloading, and transport operations. Powered equipment not only moves eggs faster but also improves working conditions. Where feasible, and ceiling heights permit, stacking equipment can make better use of vertical space thereby increasing plant capacity within existing plant facilities.

In a survey of egg assembly facilities in Iowa, poultry and egg marketing specialists from Iowa State College and the Agricultural Marketing Service, USDA, observed a palletized egg handling system in operation. In this plant a combination of manual and electric-powered pallet handling and stacking equipment is being used to handle shell and frozen eggs and poultry. Manually-operated lift trucks are used within departments for moving pallet loads short distances. An electric-powered fork-lift truck is used throughout the entire plant for moving and stacking both poultry and egg products and plant supplies as well.

The manual-type of pallet truck has a hydraulic mechanism which is actuated by means of a foot pedal. This truck is used with a double-faced pallet, 40 by 48 inches. When fully loaded the pallet holds 30 egg cases, and the entire load can be moved about the plant by one man. When not in use pallets are stacked on each other and can be moved to loading platforms or storage areas as needed. Because of its small size and light weight, the manual-type lift truck can be taken into motor trucks at the platform during loading and unloading operations.

The powered equipment in the plant studied consisted of an electric stand-up-ride type straddle-arm fork-lift truck capable of speeds up to 3 miles per hour. With a turning radius of $6\frac{1}{2}$ feet it can be used effectively in narrow aisles and can stack eggs 2 pallets high, or to an overall height of 10 cases. Because of the limited ceiling height in this plant, eggs in holding areas were stacked only 9 cases high. In any new plant construction it is recommended that a minimum clearance of 14 feet to the ceiling be provided. Special precautions should also be taken to provide doorways and aisles large enough to accomodate loaded equipment.

In the plant studied, liquid and frozen eggs in 30-pound cans were stacked 3 layers high on pallets. The pallets then were transported to

the freezer and stacked 2 pallets high, an overall height of 6 cans. Poultry and supplies also were handled on pallets; the stacking pattern being varied with the type of package or material handled.

The use of the electric-powered fork-lift truck throughout the plant has speeded up the handling of products and supplies between the various departments and holding areas. This has reduced the size of the work crew formerly required for handling operations and has also increased the productivity of these crews within each department. The large unit loads on each pallet (30 cases) has reduced the number of trips required and the number of times the products must be handled. As a result, it was felt that egg breakage was not any greater, and probably was less than it was with previous handling methods. Observations of the palletized system in the Iowa plant indicated that it provides excellent opportunities for plant operators to improve handling methods and operating efficiency.

Manually-Operated Equipment For Smaller Plants

The variety of types of equipment available, manually or power operated, should permit a great deal of flexibility in the use of the palletized system of egg handling. Light, relatively inexpensive, manually operated lift trucks are adapted to smaller plant operations where the volume handled limits the investment in materials handling equipment. In most small plants, the introduction of this type of equipment could effectively reduce the number of handling operations, thus cutting labor requirements and costs.

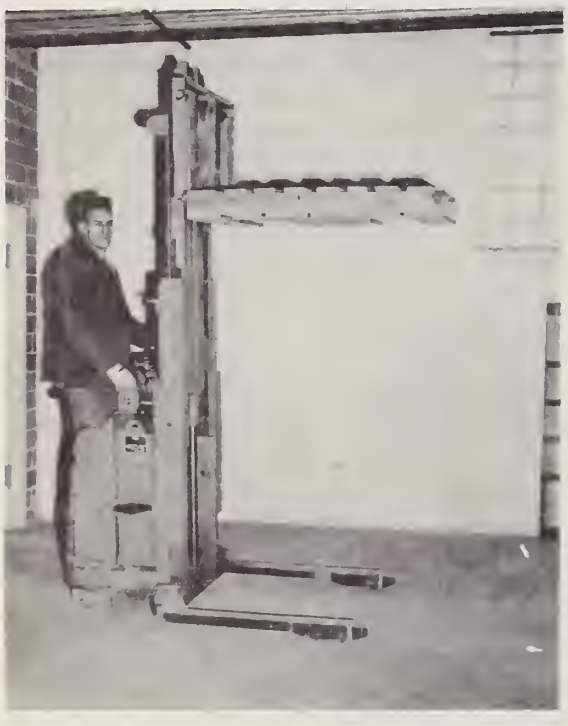
Pallets observed in use in egg handling operations were 36"x48", 40" x48", and 48"x48". In most cases the size is standardized within each plant depending upon the type of equipment used. Where possible, it is best to try to adapt a standard sized pallet to all materials handling operations. Even though pallet size is standarized, it is possible to use various types of pallets such as double-faced, single-faced, four way, wing type, box type, and disposable pallets - with the type dependent upon the product being handled and the operation being conducted

Power Equipment For Larger Plants

Powered fork-lift trucks are available in many different designs and models for various uses in larger plants. Because of their quiet operation and the absence of exhaust fumes, electric-powered types, designed for 8 hours continuous operation on one battery charge, are well adapted to inside use, particularly where food products are being handled. All types of fork-lift trucks, both riding and walking types, are designed for picking up, transporting, stacking and unstacking pallet loads. Floor load capacities, door widths, ceiling heights, aisle widths, elevator capacities, and floor conditions are some of the determining factors in whether this type of equipment can be used efficiently. Proper selection and use of fork-lift equipment requires a careful analysis of the products handled, the sequence of plant operations, and the plant facility itself. With proper equipment, it is possible to utilize floor space more efficiently, speed up operations, reduce handling and labor requirements, and thereby increase overall operating efficiency.

Pallet loads of eggs on trucks minimize handling in loading and unloading operations.

Forklift truck stacking pallet loads of eggs during receiving operations.



Electric stand-up ride forklift truck for transporting and stacking pallet loads.

Candled eggs stacked two pallets high in refrigerated cooler awaiting shipment.

Hand operated lift truck, an economical unit-load handling system for small egg assembly plants.

Pallets stacked on platform are readily available for unloading or use in other plant areas.

Pallet loads can be moved to refrigerated coolers or trucks by one operator.

Liquid eggs in 30-pound cans are stacked on pallets and transported to freezer rooms.

Toward Better Wool Grading

By E. M. Pohle

What may be another major step in a broad program aimed at improving methods of marketing wool is the application of an objective sampling method for determining fineness (grade) and variability of the product. The new method is described in a forthcoming report on a research project of the U. S. Department of Agriculture Wool Laboratory at Denver, Colorado.

In a preliminary study, technologists of the Wool Laboratory (now under the direction of the Livestock Division, Agricultural Marketing Service) have reached the conclusion that core samples--currently used to determine clean yield of baled grease wools--furnish an adequate measure of the fineness and variability of lots of visually graded wool.

The report also reveals that the size of coring tubes used to draw samples (3/8-inch pressure and $1\frac{1}{4}$-inch motor-driven types) did not appear to influence the fineness determinations and that sampling schedules for baled grease wool now used to determine clean yield are adequate for determining fineness and variability.

Findings Should Aid Trade

While further research is recommended by the report, the possibility of using core samples to determine fineness and variability of wool in the grease should be of considerable importance to the trade. With the knowledge of the fineness and variability of a lot of grease wool, the industry generally should have a more equitable basis of trading. The same information, in connection with the clean yield or "shrinkage" of their product, would give growers a more specific knowledge of what they have to sell and permit them to deal better with buyers. Since the mills know the kind of wool they can use, it also should make it easier for handlers to deal with mill buyers.

Research by USDA into the feasibility of marketing wool on a quantitative description basis has been under way for some time. One of the major problems in testing for physical characteristics to describe wool is to get a representative sample for a lot. Generally, wool is a variable commodity; it is bulky and it is impossible to test an entire lot to obtain values for quantitative descriptions. Since the fineness or grade with its variability is one of the major physical characteristics of wool and of primary concern with regard to its utility value, the development of adequate methods of sampling was of paramount importance.

Recognizing the objectiveness of the core sampling method to determine clean yield of grease wool, the Wool Laboratory began work in 1950

on the use and application of core samples to determine fineness and variability.

Preliminary tests indicated that composite core samples from a given lot of wool were homogeneous and that core sampling had "promising possibilities" as an objective sampling method to determine fineness and variability. In fact, these early tests revealed that when "card sliver" samples were used as control checks, core samples showed less difference in average diameter results than hand samples. "Card sliver" wool is a product from the first stage in the processing of the fiber after it has been scoured or cleaned.

Even with these questions answered, however, there were certain other problems. These, which are covered in the report which will be out later, were: (a) To determine if the size of coring tube used in drawing samples influenced fineness results, (b) to develop a reliable and economical plan for subsampling scoured core residues, and (c) to determine the adequacy of cores drawn for clean yield for estimating the fineness and variability of a lot of graded grease wool.

Conclusions Based on Study

In comprehensive tests, covering three lots of wool, representing fine, medium, and coarse grades, with the results re-checked aginst "card sliver" samples as a control, the following conclusions were reached:

1. Size of the coring tubes used does not appear to influence fineness results.

2. No practical significant difference in fineness between the different subsampling plans tested was detected. Therefore, subsampling plans requiring the least amount of time would be preferred.

3. Agreement noted in the fineness tests of residual scoured core samples from baled wools with the control check of card sliver samples suggests that cores drawn for clean yield are sufficient to estimate the fineness of a lot of graded grease wool.

4. Tests controlled for accuracy to a high degree showed that the sampling schedules (number of samples drawn) now in use for the determination of clean yield are adequate for the estimation of the fineness and variability of the lots tested in the study.

5. Similar tests should be conducted on lots of graded grease wool which have been put up in bags, the report recommends.

The study on which the report is based is part of a research program of USDA dealing with the development of tools, techniques, and procedures for sampling, measuring, and testing lots of wool and mohair for the various qualities basic to the development and improvement in grades and standards. In addition to the author, USDA Animal Fiber Technologists cooperating in the study were: D. D. Johnston, W. J. Manning, H. D. Ray, and W. A. Mueller.

Allocation Of Selling Space To Increase Grocery Efficiecy

By V. L. Browner and Hans Pauli

Many food retailers are missing additional business and the opportunity to cut operating costs. They are wasting valuable selling space through failure to check periodically the turnover of the many different products they feel they must carry in stock to do business.

The problem of wasted selling space - shelves and counters carrying "dead" or slow-moving items - is applicable to all food stores from the corner grocery to the largest of supermarkets. Most operators of these stores would be surprised to learn that as much as 30 percent of their selling space is taken up by products of which they sell only one unit or less a week.

Faced with higher rentals, building, labor and other costs, food retailers realize that margins are meaningless unless the products they stock can be sold. Turnover, consistent with sound merchandising and stocking practices, is the major factor of sucess in grocery retailing.

Furthermore, effective utilization of selling space in retail food stores helps reduce the cost of food distribution. Lower retail costs are of immediate help to the retailer and, in the long run, reductions in marketing costs help producers and consumers.

The major reasons why food retailers are still carrying "dead" and slow-moving items are: Failure to eliminate these "dead" stocks; brand duplication in slow-moving items; and duplication of unit sizes in the same price range.

Study Shows How To Correct Situation

That most of this could be prevented through periodic check-ups is pointed up in a recent joint study by the National Association of Retail Grocers of the United States and the U. S. Department of Agriculture. The study revealed that the allocation of selling space in grocery departments in relation to a particular product's sales performance will eliminate the "dead" items; increase the turnover of slow-selling items; reduce out-of-stock conditions; reduce duplication of unit sizes and brands; and make space available for new items.

The study was conducted in 9 successfully and independently operated food stores in the midwest with an annual sales volume of $150,000 to $1,500,000, and 2 stores of a local chain on the Atlantic Seaboard with

an annual sales volume of $1.5 and $2.5 million respectively. A total of 700 to 1,000 items of 15 to 19 grocery categories in each of the 9 stores and approximately 300 items of 2 categories in each of the 2 stores were studied. The 19 grocery categories covered in the study were: Pickles, olives and relish; Baking supplies; Canned juices; Oils and salad dressings; Beverages (not including soft drinks); Cereals; Baby Food; Spreads; Soups; Condiments; Canned vegetables; Canned fruits; Canned meat and chicken; Canned fish; Canned milk, Sugar; Pet foods; Soaps; Dietetic foods.

The relationship between the number of units sold for 15 comparable categories in the 9 midwest stores to the number of items and brands stocked, turnover and units sold per brand is shown in Table 1. Although the 3 largest stores of the group of 9 sold 228 percent more units that the 3 smallest stores, these 3 largest stores stocked only 19 percent more items and 16 percent more brands. Hence, units sold per item and per brand were considerably higher in the group of larger stores. Annual turnover was essentially the same for the medium and large size stores. The average annual turnover among the stores studied ranged from a low of 7 to a high of 20 partly because of the difference in trade areas, management, and size of stores.

Table 1.-- Relation of number of units sold (4-week period) to number of items and brands stocked, turnover and units sold per brand for 15 comparable categories in 9 stores, 1953 1/

Store group by number of units sold	Items Stocked	Brands Stocked	Units in full display	Units Sold	Average Annual Turnover	Average units sold per brand
	Number	Number	Number	Number	Number	Number
3 small.....	2,016	663	46,124	33,764	9.5	50.9
3 medium....	2,114	754	60,325	65,149	14.0	86.4
3 large.....	2,394	767	105,978	110,855	13.6	144.5

1/ Include item and brand duplication among stores.

The percentage of items with different unit sales per item for the midwest food stores in which 15 or more categories were studies are shown in Figure 1. As can be noted from the figure, at least 29 percent of the items studied in each store had sales of 10 units or less during a 4-week test period. The average for the 9 stores showed 6.5 percent of all items studied with no sales during the 4-week period; 23.4 percent with 1 through 5 unit sales; 13.8 percent with 6 through 10 units; 18.3 percent with 11 through 20 units; 10.8 percent with 21 through 30 units; and 27.2 of all items observed with sales of over 30 units in 4 weeks.

None of the 11 operators included in the study had followed a systematic stocking plan. They applied the research results obtained from their individual store by the following procedure:

1. Discontinued handling "dead" items and many of the slow-moving items for which comparable items of other brands or other sizes of the same brand were stocked.

2. Based upon the sales performance of each item during the 4-week test period and consistent with what the operators, wholesaler supervisor and researcher believed to be good merchandising stocking practices, most displays were stocked in the following manner:

a. Very fast moving items -- less than 1 week's supply was stocked to obtain more than 52 turnovers per year;

b. Fast moving items -- between 1 and 2 weeks' supply was stocked to obtain more than 26 turnovers per year;

c. Medium moving items -- about a 2 weeks' supply was stocked to obtain about 26 turnovers per year;

d. Slow moving items -- a minimum display was stocked.

Such considerations as (1) store size in relation to total sales and number of items carried; (2) stocking full rows; (3) margin differentials; (4) shelf positions; and (5) number of units packed in a case necessitated some modification in applying the above plan.

3. Stocking new items which the operators thought would be good movers in their stores in the space made available through the discontinuance of items and the decreased size of shelf displays.

Adjustments made in 3 stores for which complete data were available are shown in Figure 2. For the 16 or more categories reported in the 3 stores, the operators discontinued handling an average of 10 percent of the items formerly stocked and reduced the number of units displayed of the items formerly stocked by about 30 percent.

Study Results and Questions Raised

The results of the study indicate the need for a periodic and systematic examination of the movement of most items stocked in retail food stores. Even the above average operations surveyed indicated that many "dead" and slow-moving items were being stocked which could be advantageously discontinued and replaced by items more in demand by customers. Thus by increasing sales and turnover and reducing "outs" the operation would become more profitable as well as serve customers better.

The study raises such questions as:

1. Should cases of slow moving items be broken at the warehouse?

2. Should some merchandise be packed in smaller cases?

3. Should gondolas be made more shallow and with additional shelves to allow for more display space?

4. How can "dead" and slow moving items be detected?

5. When and how should brands, items and unit sizes be duplicated?

Fig. 1. Percentage of items with different unit sales per item in 9 midwest stores during a 4 week period, 1953

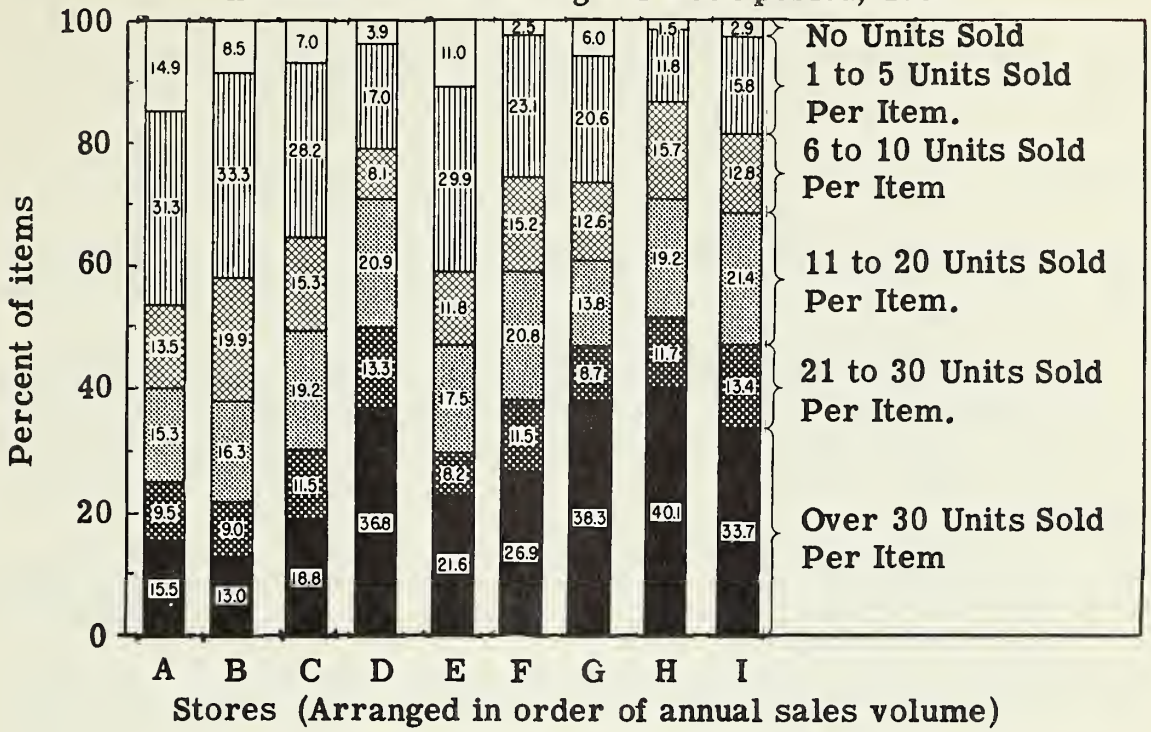
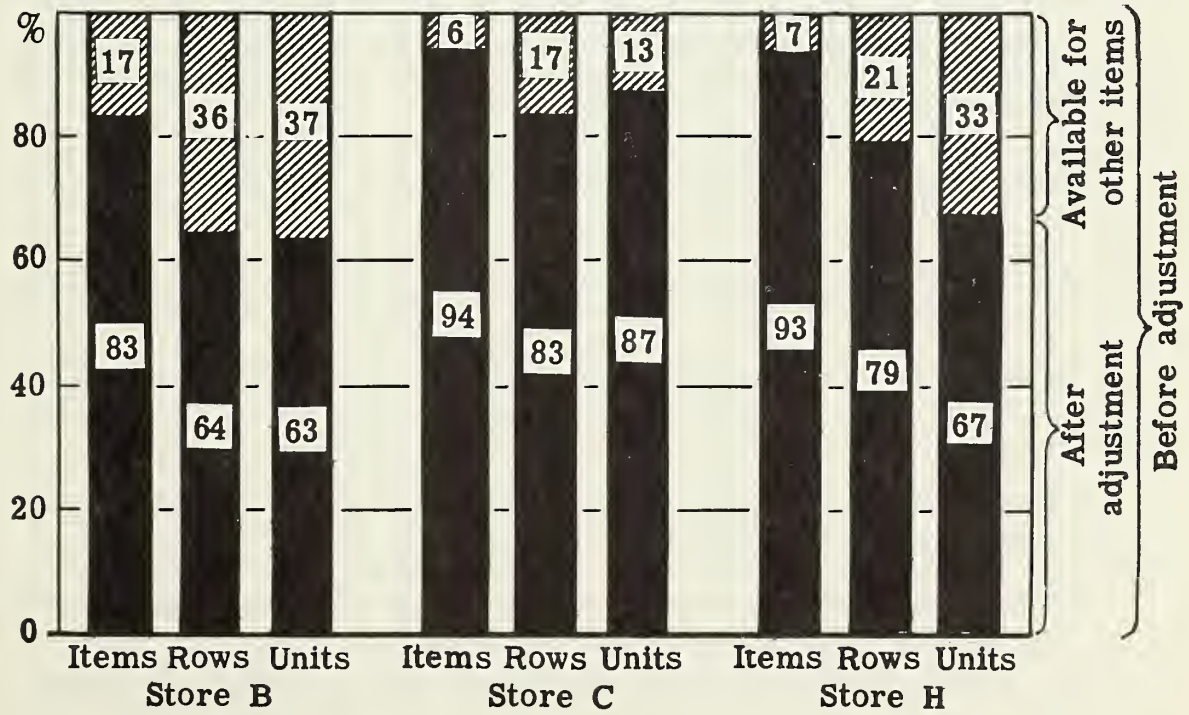


Fig. 2 Proportion of the items, rows and units remaining on display of those that were displayed during the survey in stores B, C, and H.



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